

STATE-WIDE CEREAL VARIETY TESTING PROGRAM TRIALS

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and Mike Moore

INTRODUCTION

This article reports results from cereal variety trials conducted in the Columbia Basin during 1996. These trials were conducted as part of a state-wide testing program initiated in 1992 to provide growers with local data on cereal variety performance. The program is coordinated by Russ Karow, OSU Extension Cereals Specialist, and Ernie Marx and Helle Ruddenklau, Dept. of Crop and Soil Science Research Assistants. Seed is packaged in Corvallis and distributed to trial coordinators across the state. Coordinators plant, manage and harvest trials, in some instances in cooperation with growers. Information on trial locations, coordinators and grower cooperators is given in Table 1. The Corvallis research team processes harvested grain, analyzes results and provides summary data to extension agents, seed dealers, field reps, and growers across the state and region.

Winter and spring barleys, triticales, and wheats of several market classes were tested at the 11 sites statewide, five in the Columbia Basin. Only Columbia Basin data are included in this report. Grain yield, test weight, protein, and lodging were determined for all varieties at all sites. Heading date, height, disease reactions, and other quality factors were determined as time, labor, and equipment allowed.

MATERIALS AND METHODS

Dryland plots (5 x 20 feet) at Heppner, Pendleton, and Moro were seeded at 20 seeds per square foot. Irrigated plots at LaGrande (5 x 20 feet), Hermiston (5 x 20 feet) and all other locations were seeded at 30 seeds per square foot. Seeding rates for dryland plots ranged from 46 to 114 pounds per acre, depending on variety, to attain the desired 20 seeds per square foot seeding rate. Irrigated plot seeding rates ranged from 69 to 171 pounds per acre. All trials were laid out as randomized complete block designs with three replications. Plots were seeded using small plot drills. Seeding, harvest and production practices were typical for each location.

Harvested grain was cleaned with a Pelz rub-bar cleaner. Plot yield, test weight, protein, and moisture were all determined on cleaned grain samples. Cleaned barley samples had few awns, hence test weights were atypically high, but variety to variety comparisons are valid. Yields are reported on a 10 percent moisture basis and in 60 pound bushels for wheats and triticales and in pounds per acre for barleys. Proteins are reported on a 12 percent moisture basis and were determined using a Tecator Infratec 1225 whole grain analyzer.

In addition to small-plot variety tests, large-scale winter wheat drill strip trials have been conducted across the state the last four years. Cooperating growers were provided with 50 to 80 pounds of seed of each variety to be tested. Seed for 1996 trials was donated by Eric and Marnie Anderson, Pendleton Grain Growers, and Corvallis Feed and Seed. Cooperators, often with assistance of local county agents, established single-replicate drill strip plots on their farms. These drill strips were

managed and harvested by the cooperating grower with standard field equipment. Weigh wagons or weigh pads were used to obtain yield data. Two-quart grain samples were saved from some plots and used for test weight and protein analyses. Table 2 lists sites, grower cooperators, and background information about 1996 winter wheat drill strip test plots.

RESULTS AND DISCUSSION

Small plot winter grain data are presented in Tables 3 through 6. Data from winter wheat drill strip plots are presented in Table 7. Data for spring grains are presented in Tables 8 through 11. Over-site averages are provided for dryland sites (Heppner, Moro, Pendleton). You will also find values labeled "percent of average" associated with most yield data. Percent of average data are generated by dividing a variety's yield by the trial average yield. A variety with a calculated value greater than 100 has performed better than average while a variety with a value less than 100 is below average. Calculating yield performance in this manner allows easy variety comparison across diverse environments and over years. Multi-year, percent of average yield data are presented in Tables 4 through 5 for winter grains and 9 through 10 for spring grains.

Winter wheats and triticales Over the three year period 1994-1996 across three dryland locations, the soft white wheats Stephens, Madsen, Rod, and Gene exhibited the highest yield levels (Table 5). Celia, a winter triticales, had the highest overall average. Differences among varieties, however, are not statistically significant. The top yielding wheats differed by only one percent. The yield range for the 14 winter wheats and triticales shown in Table 5 is only 15 percent or roughly 9 bushels per

acre. Given that the yield potential of these varieties appears to be similar, variety selection can be based on other criteria such as disease resistance, lodging potential, plant maturity, etc.

Average test weight was below 60 pounds per bushel at all sites except Hermiston (Table 6). Gene consistently had lower test weights than other soft white winter varieties. Otherwise, there were few differences between varieties within market classes.

Protein levels were low at Pendleton and extremely low at Moro indicating that plots may have been nitrogen deficient (Table 6). The LaGrande site has consistently had high protein levels in all years of testing.

Drill strip test data are presented in Table 7. Six varieties were included in the 1996 standard set - Gene, MacVicar, Madsen, Rod, Rohde, and Stephens. For the third consecutive year, Rod had the highest yield averaged across sites and was also the highest yielding variety at seven sites. Gene also performed well at many sites, especially those with high yield potential. Rohde club wheat has shown excellent yield potential across environments, even under high rainfall and irrigated conditions.

Winter barleys Winter barley data are shown in the bottom sections of Tables 3 and 5. Kold, Hesk, and Hundred had the highest yields. Kold outperformed Hesk and Hundred in terms of test weight (Table 6). Kold has resistance to barley stripe rust, which may be a consideration in variety selection. Steptoe, Hesk, and Scio, traditionally grown winter barleys, showed average performance. These results are consistent with trials in previous years (see

OSU Special Report 775, "Winter Cereals for 1997").

Spring wheats and triticales Spring grain data are presented in Tables 8 through 11. Alpowa (a Washington State University release intended to replace Penawawa), ID377S (a hard white released by University of Idaho breeder Ed Souza), and Penawawa were the highest yielding varieties across sites in 1996 (Table 8). Treasure, which has performed well in the past, performed poorly at Heppner and Moro in 1996. Seed supplies for Alpowa are increasing, but are still limited. In 1997, ID377S will only be grown in Idaho under contract with a growers cooperative specifically formed to manage production and marketing of this variety. Production throughout the Pacific Northwest is anticipated in 1998. Wawawai is a Wakanz replacement, both having Hessian fly resistance. Wawawai continues to perform well in the Pendleton area, but has been inconsistent at other sites. This variety should be considered for use where Hessian fly has been a problem.

Spring barleys Spring barley data are presented in Tables 8, 10 and 11. Baronesse, a two-row feed barley, continues to yield well across environments and years. Steptoe, with yields close to those of Baronesse, tends to have lower test weight and protein levels. BSR45, a barley stripe rust resistant line, is being released as "Icaro". Icaro was developed by Dr. Pat Hayes in cooperation with co-workers at ICARDA - the International Center for Agricultural Research in Dry Areas. Icaro performed well at LaGrande and Heppner, with better than average yield and test weight, and should be considered where barley stripe rust is a problem. Two hulless, waxy barleys (WPB-BZ4899-74 and Waxbar) were once again included in trials to get a better idea of hulless barley

performance across environments. Percent of average yield for Waxbar was 65 percent across the five sites. WPB-BZ4899-74, grown at just two sites, yielded slightly better than Waxbar but still below trial averages.

Seed treatments Gaucho (imidacloprid), an insecticidal seed treatment for aphid and Hessian fly control, was evaluated in both winter and spring wheat trials. The active ingredient in Gaucho is different than that in currently used insect seed treatments and could play a valuable role in resistance management. It offers another alternative to growers who prefer using a seed or in-furrow treatment in place of sprays for insect control.

For winter wheat, Russian wheat aphid and aphid control to prevent barley yellow dwarf virus infestation are needed. Neither was a problem in 1996 plots and Gaucho did not improve winter grain yields. In spring trials, wheat yields increased slightly with the Gaucho treatment at all sites, but the increase was statistically significant only at Heppner. Gaucho will be evaluated again in 1997.

Baytan, a fungicidal seed treatment, was evaluated in winter and spring barley trials. Baytan differs from other seed treatments in that it helps suppress barley stripe rust and take-all. While stripe rust was detected at all sites in 1996, disease pressure was extremely low. In the winter trials, Hesk (6RF) was the treated variety. Baytan resulted in slightly increased yields at all five Columbia Basin sites, but the increase was statistically significant at only one site. In the spring trials, Steptoe (6RF) was treated with Baytan. Baytan treated seed resulted in increased yield at four of

five sites, but the increase was statistically significant at only one site.

Dividend is a fungicidal treatment that controls dwarf bunt in wheat in addition to the diseases commonly controlled by other seed treatments. There was no dwarf bunt in any of the trials and no measured benefit to the Dividend treatment.

Raxil is similar to Vitavax with improved control of common bunt. Raxil treated wheat did not perform differently from other treatments in the Columbia Basin.

CONCLUSIONS

Data for 1996 once again show that there are few statistical differences among winter or spring grain varieties. Whether tested in small or large plots, newer varieties show a similar yield potential. It appears that factors such as available moisture, disease, and insect stress are capping yields in each environment, not the genetic yield potential of varieties *per se*. Our data suggest that growers should carefully assess those environmental factors that limit yield in each of their fields and grow newer varieties with tolerance or resistance to those stresses or to investigate other means of control. The yield potential is there; we need to allow for expression.

FOR MORE INFORMATION

Use more than one years data to make variety selection decisions. For more information, contact your local county office of the OSU Extension Service and ask for a copy of Special Report 755, "Winter Cereal Varieties for 1997," or Crop Science Report 105R, "Spring Grain Varieties for 1997." These publications contain current year and

historic variety performance data for wheats, barleys, triticales, oats, and even cereal rye. Your county agent may have other data as well.

Variety trial data and other grain production information is posted on the OSU Cereals Extension Web Page (<http://www.css.orst.edu/crops/cereals/home.htm>). We expect the web page to become an important tool for supplying information to people in the grain industry. Please help us by telling us what information you would like to see posted.

The state-wide variety testing program is a grower-driven program. If you have ideas about varieties to be included in your area or have suggestions for program improvement, contact Russ Karow, OSU Extension Cereals Specialist (541-737-5857).

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Table 1. 1996 state-wide Oregon cereal variety testing program locations, site coordinators and grower cooperators.

Trial name	Trial type	Trial location	Trial coordinator	Grower cooperator
Corvallis	all grains - dryland	Hyslop Farm	Russ Karow, Helle Ruddenklau	Charlie Anderson
Morrow Co. (Heppner)	all grains - dryland	Anderson Farm	Mike Moore	
Hermiston	all grains - irrigated	Hermiston Expt. Station	Mike Moore	
Klamath Falls	all grains - irrigated	Klamath Expt. Station	Randy Dovel	John Cuthbert
LaGrande	all grains - irrigated	Cuthbert Farm	Mike Moore	
Madras	all grains - irrigated	Central OR Expt. Station	Steve James, Mylen Bohle	
Medford	all grains - dryland	Southern OR Expt. Station	Rich Roseberg	Norm Goetze
Moro	all grains - dryland	Sherman Expt. Station	Mike Moore	
North Valley (Cornelius)	winter grains - dryland	Goetze Farm	Russ Karow, Helle Ruddenklau	
North Valley (Sheridan)	spring grains - dryland	Moritz Farm	Russ Karow, Helle Ruddenklau	Sandy & Mike Moritz
Ontario	all grains - irrigated	Malheur Expt. Station	Clint Shock, Mike Barnum	
Pendleton	all grains - dryland	Pendleton Expt. Station	Mike Moore	

Table 2. Growers, locations, and cooperating county agents for 1996 winter wheat drill strip test plots in eastern Oregon and Washington.

Grower	City	County	Irrigation	County Agent
Mary Ann Hill	Pendleton	Umatilla	No	Mike Stoltz
Dean Nichols	Dayton, WA	Columbia, WA	No	Roland Sherman
Mark Hale	Pendleton	Umatilla	No	Mike Stoltz
Sandy Macnab/Erling Jacobsen	Moro Expt. Station	Sherman	No	Sandy Macnab
Gary Brown	Wasco	Sherman	No	Sandy Macnab
Bill Miller	Dufur	Wasco	No	Sandy Macnab
Larry and Chris Kaseberg	Wasco	Sherman	No	Sandy Macnab
John Rietmann	Ione	Morrow	No	Mike Stoltz
Alan Klages	Joseph	Wallowa	Yes	Gordon Cook
Ben Holdman	Pendleton	Umatilla	No	Mike Stoltz
Mike Weimer	Clem	Gilliam	No	- -
Art Buether	Kent	Sherman	No	Sandy Macnab
Russ Erickson	Condon	Gilliam	No	Mike Stoltz

Table 3. 1996 variety testing program winter grain yields across five Columbia Basin locations.

Table 3. 1996 variety testing program winter grain yields across five Columbia Basin locations.													
Variety/ line	Market class	Hermiston	LaGrande	Moro	Heppner	Pendleton	3 site* average	Hermiston	LaGrande	Moro	Heppner	Pendleton	3 site* average
Winter wheats and triticales		Yield (60 pound bu/a; 10% moisture)						Yield as a percent of trial average					
Daws	SW	97	33	64	46	79	63	101	93	95	88	99	94
Gene	SW	86	11	76	37	86	66	90	32	113	69	108	97
Hill 81	SW	104	79	65	54	86	68	108	220	97	101	107	102
Hiller	Club	93	20	75	58	89	74	96	57	112	110	112	111
Hyak	Club	69	24	74	54	88	72	71	68	111	102	110	107
Lewjain	SW	103	62	65	56	80	67	107	173	98	106	101	101
MacVicar	SW	95	34	74	38	72	61	98	96	110	72	90	91
Madsen	SW	93	51	70	57	81	69	97	143	104	107	101	104
Madsen+Stephens	SW	99	34	69	49	76	65	103	96	103	93	95	97
Malcolm	SW	93	39	67	33	66	55	96	109	100	63	83	82
Rely	Club	90	40	59	51	78	63	94	111	88	96	98	94
Rod	SW	108	63	79	57	89	75	112	177	118	108	112	113
Rohde	Club	94	19	67	55	71	64	98	53	100	105	88	98
Stephens	SW	100	36	76	46	75	65	104	99	113	86	94	98
Stn with Gaucho**	SW	97	36	77	45	76	66	100	102	114	85	95	98
Stn with Dividend**	SW	89	43	73	43	78	64	92	120	109	80	97	96
Stn with Raxil**	SW	90	35	82	43	76	67	93	98	122	80	96	99
W301	SW	91	38	69	42	75	62	94	105	103	79	93	92
Celia	Triticale	93	27	58	51	92	67	96	76	87	96	115	99
WA7752	Club	97	23	63	54	92	69	100	63	94	102	115	103
ID8614502b	SW	90	36	67	52	84	67	93	99	99	98	105	101
ID467	HR	86	36	59	49	84	64	89	100	88	93	105	95
OR929049-CLB	Club	92	24	61	43	82	62	95	67	91	82	103	92
OR92054-CLB	Club	68	16	61	55	70	62	71	44	91	104	87	94
RS87-123	Triticale	131		54	87	85	75	135		80	165	106	117
RS87-183	Triticale	123		56	80	71	69	127		83	151	89	108
RS87-202	Triticale	137		51	91	78	73	142		76	173	98	116
Trial average		97	36	67	53	80	67						
PLSD (5%)		18	10	12	10	10	NS						
PLSD (10%)		15	8	10	9	8	NS						
CV		12	17	11	12	8	16						
P-VALUE		0.00	0.0	0.00	0.00	0.00	0.94						
Winter barleys		Yield (lb/a; 10% moisture)						Yield as a percent of trial average					
Gwen	6RF	1478	3386	2994	5125	4185	4101	36	118	72	96	77	82
Hesk	6RF	4498	2605	4403	5849	5757	5336	110	90	105	109	106	107
Hesk with Baytan**	6RF	4649	2842	5389	6011	5851	5750	114	99	129	112	108	116
Hundred	6RF	3730	2112	4663	5007	5731	5134	91	73	111	94	106	104
Kold	6RF	5186	4153	4357	5470	5940	5255	127	144	104	102	110	105
Scio	6RF	4715	2599	4575	5180	5131	4962	115	90	109	97	95	100
Step toe	6RF	3456	2080	3486	5226	4492	4401	85	72	83	98	83	88
Strider	6RF/M	4990	3272	3623	4928	6252	4934	122	114	87	92	115	98
Average		4088	2881	4186	5350	5417	4984						
PLSD (5%)		1012	930	1042	NS	502	845						
PLSD (10%)		831	764	855	NS	412	694						
CV		14	18	14	11	5	10						
P-value		0.00	0.00	0.00	0.01	0.00	0.02						

*Does not include Hermiston and LaGrande due to hail and frost damage, respectively.

** Gaucho is a seed treatment insecticide. Baytan, Dividend, and Raxil are a seed treatment fungicides.

Table 4. 1994-96 winter grain yields across four Columbia Basin locations.

Variety/ line	Market class	LaGrande	Moro	Heppner	Pendleton	3 site* average
Yields expressed as percent of average						
1994						
Celia	Triticale	99	133	113	124	123
Daws	SW	104	100	87	103	97
Gene	SW	99	107	119	114	113
MacVicar	SW	102	98	114	109	107
Madsen	SW	112	98	107	102	102
Malcolm	SW	94	95	127	111	111
Rod	SW	109	123	100	91	105
Rohde	Club	106	129	95	102	108
Stephens	SW	97	105	128	116	116
W301	SW	100	108	123	117	116
Average yield (bu/a)		91	37	65	76	
1995						
Celia	Triticale	98	103	92	128	108
Daws	SW	120	107	104	96	103
Gene	SW	113	107	115	110	111
MacVicar	SW	93	93	78	101	91
Madsen	SW	88	102	128	111	114
Malcolm	SW	124	110	121	94	108
Rod	SW	104	111	109	90	104
Rohde	Club	99	104	107	83	98
Stephens	SW	90	108	109	114	110
W301	SW	104	104	112	104	107
Average yield (bu/a)		85	52	44	84	
1996						
Celia	Triticale	76	87	96	115	99
Daws	SW	93	95	88	99	94
Gene	SW	32	113	69	108	97
MacVicar	SW	96	110	72	90	91
Madsen	SW	143	104	107	101	104
Malcolm	SW	109	100	63	83	82
Rod	SW	177	118	108	112	113
Rohde	Club	53	100	105	88	98
Stephens	SW	99	113	86	94	98
W301	SW	105	103	79	93	92
Average yield (bu/a)		36	67	53	80	
1994-96						
Celia	Triticale	91	108	100	122	110
Daws	SW	106	101	93	99	98
Gene	SW	81	109	101	110	107
MacVicar	SW	97	100	88	100	96
Madsen	SW	114	101	114	105	107
Malcolm	SW	109	102	103	96	100
Rod	SW	130	117	106	98	107
Rohde	Club	86	111	102	91	101
Stephens	SW	95	108	108	108	108
W301	SW	103	105	105	105	105
1994-96 average yield (bu/a)		71	52	54	80	

*Averaged across Moro, Morrow and Pendleton locations.

Table 5. 1994-96 winter grain yields across three Columbia Basin locations.

Variety	Market class	Moro	Heppner	Pendleton	3 site average
Yields expressed as percent of average					
<i>Winter wheats and triticales</i>					
Daws	SW	101	93	99	98
Gene	SW	109	101	110	107
Hill 81	SW	97	101	105	101
Hyak	Club	106	96	106	103
Lewjain	SW	100	92	99	97
MacVicar	SW	100	88	100	96
Madsen	SW	101	114	105	107
Malcolm	SW	102	103	96	100
Rely	Club	99	92	95	95
Rod	SW	117	106	98	107
Rohde	Club	111	102	91	101
Stephens	SW	108	108	108	108
W301	SW	105	105	105	105
Celia	Triticale	108	100	122	110
1994-96 average yield (bu/a)		52	54	80	62
<i>Winter barleys</i>					2-site average
Gwen	6RF	—	97	86	92
Hesk	6RF	—	110	107	108
Hundred	6RF	—	103	115	109
Kold	6RF	—	106	118	112
Steptoe	6RF	—	95	94	94
1994-96 average yield (lb/a)		—	4222	4763	4532

Table 6. 1996 variety testing program winter grain test weight and protein data across five Columbia Basin locations

Variety/ line	Market class	3 site*						3 site*					
		Hermiston	LaGrande	Moro	Heppner	Pendleton	average	Hermiston	LaGrande	Moro	Heppner	Pendleton	average
<i>Winter wheats and triticales</i>		Test weight (lb/bu)						Protein percent (12% moisture)					
Daws	SW	63.5	60.7	59.1	60.1	60.1	59.8	11.3	14.3	6.1	8.2	7.6	7.3
Gene	SW	62.0	57.4	57.1	55.1	56.7	56.3	12.0	14.8	6.7	8.5	8.6	7.9
Hill 81	SW	63.7	62.2	58.1	59.4	59.9	59.1	11.6	13.5	6.7	8.7	8.0	7.8
Hiller	Club	61.2	58.0	56.4	58.2	56.8	57.1	11.1	14.6	6.1	9.9	7.3	7.7
Hyak	Club	62.0	58.6	56.5	58.1	58.7	57.8	12.0	15.0	6.5	11.2	7.2	8.3
Lewjain	SW	63.2	60.2	58.5	60.6	60.5	59.9	11.1	13.1	5.6	6.9	7.9	6.8
MacVicar	SW	63.1	59.5	58.7	57.8	58.6	58.3	11.2	13.1	6.3	8.6	8.2	7.7
Madsen	SW	63.0	60.9	57.8	59.7	60.3	59.3	12.1	14.5	6.1	10.1	8.7	8.3
Madsen+Stephens	SW	62.6	58.9	56.4	60.3	58.9	58.5	11.3	13.9	5.9	11.2	8.2	8.4
Malcolm	SW	62.9	60.1	59.4	58.9	59.3	59.2	11.4	13.2	6.2	8.6	7.6	7.5
Rely	Club	62.0	60.2	56.3	58.9	58.7	58.0	11.0	14.4	6.0	7.5	7.0	6.9
Rod	SW	61.2	60.5	58.4	59.9	59.7	59.4	10.6	13.1	6.0	7.9	7.4	7.1
Rohde	Club	63.2	58.0	56.7	60.5	60.0	59.0	11.8	14.3	6.5	7.7	7.5	7.2
Stephens	SW	62.4	59.7	57.9	58.9	58.6	58.5	11.5	14.2	7.1	8.3	8.0	7.8
Stn with Gaucho**	SW	62.9	58.8	57.8	59.1	58.2	58.3	11.1	14.0	7.1	8.9	8.0	8.0
Stn with Dividend**	SW	61.7	59.0	57.9	58.0	58.6	58.2	11.2	13.6	7.1	11.2	8.1	8.8
Stn with Raxil**	SW	62.4	59.2	58.2	57.7	58.4	58.1	11.5	13.9	7.7	12.1	8.5	9.4
W301	SW	63.2	59.4	57.7	59.5	58.5	58.6	11.4	13.8	6.3	9.9	8.7	8.3
Celia	Triticale	59.7	57.0	58.5	56.3	57.9	57.6	10.6	13.3	4.9	9.0	7.3	7.1
WA7752	Club	63.0	61.1	57.0	60.1	61.1	59.4	11.9	15.3	5.8	11.9	8.1	8.6
ID8614502b	SW	63.4	59.6	57.4	59.7	60.1	59.1	12.1	13.9	5.7	9.3	8.0	7.6
ID467	HR	63.0	60.3	58.8	60.7	60.2	59.9	11.4	14.1	6.4	10.7	7.8	8.3
OR929049-CLB	Club	60.8	58.4	56.9	59.3	57.5	57.9	10.2	12.7	5.1	10.5	7.7	7.7
OR92054-CLB	Club	62.9	60.6	56.4	60.0	59.1	58.5	12.7	15.0	5.8	7.7	7.6	7.0
RS87-123	Triticale	59.2		53.7	56.5	57.0	55.7	11.0		7.3	8.2	8.3	8.0
RS87-183	Triticale	58.8		54.5	55.9	56.9	55.8	11.1		7.4	8.3	8.4	8.0
RS87-202	Triticale	58.5		54.2	56.9	56.4	55.8	11.3		6.9	8.8	8.2	8.0
Trial average		62.1	59.5	57.3	58.8	58.8	58.3	11.4	14.0	6.3	9.2	7.9	7.8
PLSD (5%)		1.0	1.4	2.0	1.5	1.1	1.5	0.8	0.4	1.3	NS	0.8	NS
PLSD (10%)		0.9	1.2	1.7	1.3	0.9	1.2	0.7	0.3	1.1	2.6	0.6	NS
CV		1	1	2	2	1	2	4	2	13	21	6	11
P-VALUE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.01	0.06	0.00	0.11
<i>Winter barleys</i>		Test weight (lb/bu)						Protein percent (12% moisture)					
Gwen	6RF	41.2	38.3	53.2	54.4	53.4	53.7	10.7	12.4	7.0	8.8	9.3	8.4
Hesk	6RF	47.5	37.4	51.2	49.5	51.3	50.7	11.4	13.2	5.1	7.3	7.2	6.5
Hesk with Baytan**	6RF	47.2	35.3	51.2	48.3	51.1	50.2	11.3	12.9	5.5	8.4	8.1	7.3
Hundred	6RF	45.1	34.4	50.6	49.1	50.3	50.0	12.3	13.0	5.5	9.1	8.0	7.5
Kold	6RF	50.5	44.0	53.0	50.8	51.7	51.8	12.4	13.3	4.8	8.2	7.9	7.0
Scio	6RF	46.6	29.7	51.1	49.7	51.6	50.8	11.3	12.2	5.5	7.9	8.3	7.3
Steptoe	6RF	46.5	30.1	52.7	50.4	52.7	51.9	10.8	11.1	5.2	7.6	7.6	6.8
Strider	6RF/M	48.3	42.5	51.9	48.8	52.4	51.0	11.3	12.6	5.4	7.6	8.1	7.0
Average		46.6	36.5	51.9	50.1	51.8	51.3	11.4	12.6	5.5	8.1	8.1	7.2
PLSD (5%)		2.1	3.0	0.6	2.8	0.6	1.7	1.1	0.6	0.7	NS	0.6	0.6
PLSD (10%)		1.7	2.4	0.5	2.3	0.5	1.37	0.9	0.5	0.5	NS	0.5	0.5
CV		3	5	1	3	1	4	5	3	7	12	4	5
P-value		0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.36	0.00	0.00

*Does not include Hermiston and LaGrande due to hail and frost damage, respectively.

** Gaucho is a seed treatment insecticide. Baytan, Dividend, and Raxil are a seed treatment fungicides.

Table 7. 1996 winter wheat variety drill strip trials across eastern Oregon and Washington locations.

Variety	Hill Pendleton	Nichols Dayton,WA	Hales Midway	Macnab Moro	Brown Wasco	Miller Dufur	Kaseberg Wasco	Rietmann Condon	Holdman Pendleton	Klages Joseph	Weimar Clem	Buether Kent	Ericksen Condon	Average
Gene	123	123	107	95	86	92	78	73	67	59	69	52	15	87
MacVicar	117	105	104	83	91	79	70		65	55	63	63		
Madsen	108	118	102	82	75	95	67	68	61	72	65	52	35	85
Rod	128	130	97	93	91	68	102	75	74	81	65	60	20	90
Rohde	104	100	94		64	63	61	63	70	48	56	58	20	
Stephens	115	116	107	86	85	68	67	72	59	61	61	56	16	82
Eltan		103												
Lambert		117												
Mac1	114	110	99						63	82				
Mix				96		92					63			
W301	116		103		73		95	72	64	48	63			
Average	116	115	102	88	82	77	74	70	66	63	63	57	21	86

A site at Lyle Peck's was lost to hail damage.

Macnab evaluated 10 two-way mixtures. The mix reported, Madsen-Gene, was the highest yielding.

The Miller mix is a Madsen-Rod combination. A Crew-Hyak mixture tested in the same trial yielded 95 bu/a.

The Weimar mix is a W301-MacVicar combination.

Table 8. 1996 variety testing program spring grain yields across five Columbia Basin locations.

Variety/ line	Market class	Hermiston	LaGrande	Moro	Heppner	Pendleton	3-site** average	Variety/ line	Hermiston	aGrande	Moro	Heppner	Pendleton	3-site** average	
<i>Spring wheats and triticales</i>		Yield (60 pound bu/a; 10% moisture)						<i>Spring wheats and triticales</i>		Yield as a percent of trial average					
Alpowa	SW	68	84	54	30	39	41	Alpowa	87	125	113	114	100	109	
Alpowa with Gaucho**	SW	83	84	55	44	45	48	Alpowa with Gaucho**	106	125	115	168	115	133	
Centennial	SW	77	56	47	29	34	36	Centennial	99	84	98	110	87	98	
Dirkwin	SW	77	88	44	23	34		Dirkwin	99	131	91	88	87	89	
ID377S	HW	81	75	48	33	41	41	ID377S	104	112	100	125	107	111	
ID462	HR	83	65					ID462	106	97					
ID488	SW	87	67	51	26	45	40	ID488	112	99	106	97	115	106	
Klasic	HW	74	23	47	22	43	37	Klasic	95	34	98	83	110	97	
OR4895181	HW	76	72	47	23	38	36	OR4895181	97	106	98	87	99	95	
Penawawa	SW	84	67	54	32	39	42	Penawawa	108	99	112	123	100	111	
Pomerelle	SW	81	80	44	23	43	37	Pomerelle	104	119	92	86	111	96	
RSI310	Triticale		105			37		RSI310		156				96	
SDM405S	SW	77	75	50	26	34	37	SDM405S	99	111	105	99	89	98	
Sunstar Promise	SW	76	68	51	24	38	38	Sunstar Promise	97	101	106	92	97	98	
Treasure	SW	84	95	37	17	40	31	Treasure	108	142	76	66	103	82	
Trical 2700	Triticale	78	87	37	20	37	31	Trical 2700	100	128	77	75	94	82	
WPB881	Durum		29		25	29		WPB881		43		95	74		
WPB926R	HR	75	38	46	28	37	37	WPB926R	96	56	96	108	96	100	
WPB936R	HR	72	60	49	28	43		WPB936R	92	89	101	107	110	106	
Wawawai	SW	80	61	50	22	43	38	Wawawai	103	90	104	82	110	99	
Whitebird	SW	76	79	52	21	39	37	Whitebird	97	117	109	79	101	96	
Yecora Rojo	HR	73	24	50	31	38	40	Yecora Rojo	94	35	104	119	97	107	
Trial average		78	67	48	26	39	38								
PLSD (5%)	NS	14	10	8		NS	6								
PLSD (10%)	NS	12	8	6		NS	5								
CV	9	13	13	18		15	10								
P-VALUE	0.21	0.00	0.03	0.00	0.13		0.00								
<i>Spring barleys</i>		Yield (lb/a; 10% moisture)						<i>Spring barleys</i>		Yield as a percent of trial average					
Baronesse	2RF	5443	4028	3700	1976	3523	3066	Baronesse	128	95	105	126	124	118	
Bear (WA11045-87)	6R hullless	4001	2712	3019	1225	3080	2441	Bear (WA11045-87)	94	64	86	78	108	91	
Colter	6RF	3802	5190	4029	1277	2615	2640	Colter	89	123	115	81	92	96	
Crest	2RM	4349	3167	3359	1380	3264	2667	Crest	102	75	96	88	115	99	
Galena	2RM	4685						Galena	110						
Icaro (BSR 45)	2RM		5463		2201			Icaro (BSR 45)		129		140			
Idagold	2RF	4110						Idagold	97						
Maranna	6RF	4468	5645	3783	1329	3101	2738	Maranna	105	133	108	84	109	100	
Payette	6RF	3686	5435	3586	1407	2336	2443	Payette	87	128	102	89	82	91	
Russell	6RM	3947	5440	3853	1983	2864	2900	Russell	93	128	110	126	101	112	
Steptoe	6RF	4526	2774	3777	1661	3287	2908	Steptoe	106	66	108	106	116	110	
Steptoe with Baytan*	6RF	4648	3960	4104	2099	2692	2965	Steptoe with Baytan*	109	94	117	133	95	115	
WPB-BZ489-74	6R hullless			2878		2401		WPB-BZ489-74			82		85		
Waxbar	6R hullless	3343	2758	2549	766	2062	1792	Waxbar	79	65	73	49	73	65	
Trial average		4251	4234	3512	1573	2839	2641								
PLSD (5%)	554	1463	600	412		828	546								
PLSD (10%)	458	1210	496	341		685	451								
CV	8	20	10	15		17	12								
P-VALUE	0.00	0.00	0.00	0.00	0.03		0.01								

* Gaucho is a seed treatment insecticide. Baytan is a seed treatment fungicide.

**Does not include Hermiston nor LaGrande (irrigated sites)

Table 9. 1994-96 spring grain yields across five Columbia Basin locations.

Variety	Market class	Hermiston*	LaGrande	Moro	Heppner	Pendleton	3-site** average
Yields expressed as percent of average							
1994							
Alpowa	SW	117	122	107	104	108	106
Centennial	SW	126	97	115	77	91	94
Dirkwin	SW	97	91	90	15	44	50
ID 377S	HW	125	97	109	169	116	132
Klasic	HW	105	119	103	155	106	121
Penawawa	SW	92	88	102	36	76	71
Treasure	SW	118	100	106	108	87	100
Wawawai	SW	122	96	103	60	147	103
WPB926R	HR	105	95	109	160	152	140
Yecora Rojo	HR	99	131	121	163	89	125
Average yield (bu/a)		60	40	40	14	43	32
1995							
Alpowa	SW	--	112	98	115	120	111
Centennial	SW	--	106	104	109	97	103
Dirkwin	SW	--	109	101	114	93	102
ID377S	HW	--	114	103	113	109	108
Klasic	HW	--	89	96	110	69	92
Penawawa	SW	--	108	97	96	103	99
Treasure	SW	--	104	101	89	122	104
Wawawai	SW	--	125	101	109	115	108
WPB926R	HR	--	92	93	108	93	98
Yecora Rojo	HR	--	94	102	116	100	106
Average yield (bu/a)			55	51	35	56	47
1996							
Alpowa	SW	87	125	113	114	100	109
Centennial	SW	99	84	98	110	87	98
Dirkwin	SW	99	131	91	88	87	89
ID377S	HW	104	112	100	125	107	111
Klasic	HW	95	34	98	83	110	97
Penawawa	SW	108	99	112	123	100	111
Treasure	SW	100	142	76	66	103	82
Wawawai	SW	108	90	104	82	110	99
WPB926R	HR	96	56	96	108	96	100
Yecora Rojo	HR	94	35	104	119	97	107
Average yield (bu/a)		78	67	48	26	39	38
1994-96 average							
Alpowa	SW	--	120	106	111	109	109
Centennial	SW	--	95	105	98	92	99
Dirkwin	SW	--	110	94	72	74	80
ID377S	HW	--	107	104	136	111	117
Klasic	HW	--	81	99	116	95	103
Penawawa	SW	--	98	104	85	93	94
Treasure	SW	--	115	94	87	104	95
Wawawai	SW	--	104	103	84	124	103
WPB926R	HR	--	81	99	125	114	113
Yecora Rojo	HR	--	87	109	133	95	112
1994-96 average yield (bu/a)			54	46	25	46	39

* Hermiston trial lost to hail in 1995 and early varieties hail damaged in 1996.

**Does not include Hermiston nor LaGrande (irrigated sites)

Table 10. 1994-96 spring barley yields across five Columbia Basin locations.

Variety	Market class	Hermiston*	LaGrande	Moro	Heppner	Pendleton	3-site** average
Yields expressed as percent of average							
<i>1994</i>							
Baronesse	2RM	109	102	100	138	110	116
Colter	6RF	106	100	102	75	99	92
Crest	2RM	102	112	92	108	95	98
Maranna	6RF	115	96	104	72	107	94
Russell	6RM	97	98	94	70	90	84
Steptoe	6RF	82	87	110	151	99	120
Average yield (lb/a)		6393	3707	3010	2124	4944	3359
<i>1995</i>							
Baronesse	2RF	--	115	120	114	114	116
Colter	6RF	--	100	108	98	118	108
Crest	2RM	--	104	104	98	103	102
Maranna	6RF	--	80	103	86	82	90
Russell	6RM	--	99	92	106	83	94
Steptoe	6RF	--	93	108	103	114	108
Average yield (lb/a)			3722	3490	2607	4456	3517
<i>1996</i>							
Baronesse	2RF	128	95	105	126	124	118
Colter	6RF	89	123	115	81	92	96
Crest	2RM	102	75	96	88	115	99
Maranna	6RF	105	133	108	84	109	100
Russell	6RM	93	128	110	126	101	112
Steptoe	6RF	106	66	108	106	116	110
Average yield (lb/a)		4251	4234	3512	1573	2839	2641
<i>1994-96</i>							
Baronesse	2RF	--	104	109	126	116	117
Colter	6RF	--	108	108	84	103	99
Crest	2RM	--	97	97	98	104	100
Maranna	6RF	--	103	105	81	99	95
Russell	6RM	--	108	98	101	91	97
Steptoe	6RF	--	82	108	120	109	113
1994-96 average yield (lb/a)			2647	2174	1232	2594	2000

* Hermiston site lost to hail in 1995 and early varieties hail damaged in 1996.

**Does not include Hermiston nor LaGrande (irrigated sites)

Table 11. 1996 variety testing program spring grain test weight and protein across five Columbia Basin locations.

Variety/ line	Market class	Hermiston	LaGrande	Moro	Heppner	Pendleton	3-site** average	Hermiston	LaGrande	Moro	Heppner	Pendleton	3-site** average
<i>Spring wheats and triticales</i>		Test weight (lb/bu)						Protein percent (12% moisture)					
Alpowa	SW	61.6	63.4	58.9	53.7	61.1	57.9	11.0	13.5	10.9	13.5	9.0	11.1
Alpowa with Gaucho*	SW	60.7	63.1	58.9	55.0	60.8	58.2	11.3	13.3	10.5	12.9	9.7	11.0
Centennial	SW	62.3	62.5	56.9	54.0	60.5	57.1	11.6	13.7	11.8	13.4	10.0	11.7
Dirkwin	SW	58.4	56.4	52.5	47.8	56.3	52.2	11.2	12.2	11.8	13.9	10.7	12.1
ID377S	HW	63.0	61.8	56.9	53.7	62.6	57.7	11.9	14.8	12.6	14.1	10.7	12.5
ID462	HR	63.1	60.9					12.4	14.5				
ID488	SW	62.3	62.4	56.3	51.5	60.9	56.2	10.8	13.0	10.9	13.7	8.7	11.1
Klasic	HW	65.4	60.4	58.5	55.0	63.4	59.0	11.8	16.2	12.5	14.3	10.6	12.5
OR4895181	HW	60.1	59.5	55.9	49.4	59.0	54.8	12.8	14.0	12.3	14.3	10.7	12.4
Penawawa	SW	62.4	61.4	58.3	54.1	61.1	57.8	11.1	14.1	11.6	13.5	9.2	11.4
Pomerelle	SW	60.9	57.7	54.9	50.1	60.3	55.1	11.4	12.5	12.1	13.9	9.5	11.8
RSI310	Triticale		55.6			54.5			11.4			9.0	
SDM405S	SW	62.5	62.6	58.9	53.7	61.2	57.9	11.1	12.7	11.2	13.8	9.9	11.6
Sunstar Promise	SW	62.6	62.2	59.9	52.8	61.1	57.9	10.7	12.5	10.7	13.8	9.5	11.3
Treasure	SW	58.8	60.7	46.4	49.4	60.5	52.1	11.0	12.4	12.7	15.0	9.2	12.3
Trical 2700	Triticale	50.2	51.2	47.2	42.5	53.1	47.6	11.5	11.7	11.2	13.7	8.9	11.3
WPB881	Durum		59.7		54.0	60.8			15.2		15.0	12.5	
WPB926R	HR	61.3	59.4	58.8	53.3	61.9	58.0	13.1	15.2	13.0	14.7	10.9	12.9
WPB936R	HR	62.5	61.3	58.3	53.4	62.8	58.2	13.3	14.1	12.0	14.3	10.5	12.3
Wawawai	SW	61.5	61.9	56.5	50.2	62.0	56.2	11.5	13.5	11.1	14.5	9.7	11.8
Whitebird	SW	62.6	61.4	58.0	51.2	60.7	56.6	11.3	12.4	11.1	14.2	9.6	11.6
Yecora Rojo	HR	64.3	60.8	60.3	56.4	63.3	60.0	12.6	16.1	12.7	14.4	10.6	12.6
Average		61.3	60.3	56.4	52.1	60.4	56.3	11.7	13.6	11.7	14.0	9.9	11.9
PLSD (5%)		2.0	1.8	6.6	3.2	1.0	2.6	0.8	0.5	0.7	NS	0.7	0.7
PLSD (10%)		1.7	1.5	5.5	2.6	0.8	2.2	0.7	0.4	0.6	NS	0.6	0.6
CV		2	2	7	4	1	3	4	2	4	7	4	4
P-VALUE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00
<i>Spring barleys</i>													
Baronesse	2RF	55.6	52.3	55.1	49.4	54.1	52.9	9.4	13.6	10.9	12.5	9.2	10.9
Bear (WA11045-87)	6R hulless	58.8	56.9	52.6	54.0	57.5	54.7	10.5	15.2	11.3	13.4	9.2	11.3
Colter	6RF	52.6	52.8	51.9	42.8	52.5	49.1	8.6	11.1	9.4	12.2	8.3	10.0
Crest	2RM	55.1	52.5	50.3	46.0	54.1	50.1	9.9	14.0	9.9	12.8	8.9	10.5
Galena	2RM	54.9						9.4					
Icaro (BSR 45)	2RM		54.1		52.0				13.1		13.0		
Idagold	2RF	53.4						9.8					
Maranna	6RF	51.8	51.2	50.3	41.3	52.7	48.1	8.9	13.4	10.5	14.7	9.3	11.5
Payette	6RF	53.2	52.4	52.6	42.4	52.5	49.2	9.9	13.5	10.4	13.8	9.0	11.1
Russell	6RM	53.5	53.0	52.9	46.6	54.0	51.2	9.3	12.0	9.2	11.3	8.8	9.8
Steptoe	6RF	51.6	45.1	48.3	42.6	55.6	48.8	9.3	12.9	9.3	12.2	9.7	10.4
Steptoe with Baytan*	6RF	51.4	46.6	50.3	40.9	52.4	47.9	9.1	12.4	9.0	12.0	9.1	10.0
WPB-BZ489-74	6R hulless			59.0		58.3				12.7		10.6	
Waxbar	6R hulless	58.2	56.3	53.8	42.7	55.9	50.8	10.0	17.2	12.2	16.3	10.4	13.0
Average		54.2	52.1	52.5	45.5	54.5	50.8	9.5	13.5	10.4	13.1	9.3	10.9
PLSD (5%)		1.1	2.2	3.1	3.7	NS		0.7	1.0	1.1	1.5	NS	
PLSD (10%)		0.9	1.8	2.6	3.0	NS		0.6	0.8	0.9	1.3	NS	
CV		1	3	4	5	6		4	4	6	7	14	
P-VALUE		0.00	0.00	0.00	0.00	0.40		0.00	0.00	0.00	0.00	0.64	

* Gaucho is a seed treatment insecticide. Baytan is a seed treatment fungicide.

**Does not include Hermiston nor LaGrande (irrigated sites)